Fall 2023 PSY471H1 LEC0201
Seminar in Cognition:
Computational Psychology

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Time	W 13:00–15:00
Location	HS 614
Email	can.mekik@utoronto.ca
Office	SS 6015
Office Hours	W 12:00-13:00 or by appointment

1 Introduction

Computational cognitive models explain psychological phenomena by simulating psychological mechanisms and processes. This seminar surveys the field of computational cognitive modeling (i.e., computational psychology). Topics include major cognitive modeling paradigms, the benefits and pitfalls of cognitive modeling, simulation experiments, model evaluation, and recent developments.

There are a great many approaches in cognitive modeling and we cannot cover all of them extensively in one course. Therefore, to provide a good point of reference, this course focuses primarily on the cognitive architectural approach (mainly ACT-R) and addresses classic topics in cognitive psychology (like list memory and multitasking). That said, we will also read about accumulator models and neural network models. Furthermore, you will have opportunities to steer focus towards other approaches and topics that interest you later on in the course.

Furthermore, the readings touch on three recent developments currently unfolding in cognitive modeling, which should help us get a sense for where the field might be heading and what challenges may lay ahead. First, there is growing emphasis on neuroscientific findings and data. For instance, some cognitive models attempt to capture fMRI data in addition to traditional behavioral metrics like response choice and RT. Second, there is growing rapproachment between mathematical psychology and cognitive modeling, which has revealed some intriguing correspondences between various models. Third, and finally, there seems to be increasing convergence in cognitive architectures, as evidenced by the development of the 'Common Model of Cognition'.

1.1 Learning Objectives

In this course you will learn to:
- Identify the major cognitive modeling approaches
- Situate a cognitive modeling study within the appropriate approach
- Discuss similarities and differences among different cognitive modeling approaches
- Discuss the significance and implications of a cognitive modeling study
- Evaluate the strengths and limitations of a cognitive modeling study
- Evaluate potential uses of cognitive models in research and industry
- Develop research questions for cognitive modeling studies
- Develop a conference-length cognitive modeling research paper

2 Polices

2.1 Participation

Your active engagement in the class is essential to the quality of the course for everyone. I expect you to attend every class, read assigned readings ahead of class, and participate in both class and online discussions.

Please engage with me and your classmates in a kind and courteous manner. Even if you find yourself disagreeing with what is said, you should take care to express your thoughts in a calm and respectful way. Hostile, offensive, or discriminatory remarks will not be tolerated in class or online.

Please do keep in mind that, as a student in a large institution with a diverse community, behavior that you may find acceptable may, in fact, be unacceptable to others. Also consider that you may make mistakes, even with good intentions. I strongly recommend that you prepare yourself to handle such situations gracefully. Additionally, please review the statement on Equity, Diversity, and Inclusion provided below.

Discussion Board A discussion board will be available for asyncronous questions, comments, and discussion relating to the course. As participation, posts on this board are just as valuable as contributions in class. The discussion board is a great place to post comprehension questions or to help your fellow classmates get through a reading. It is also a great place to post questions about assignments and other logistical matters. If you have a question about the course, I encourage you to post it on the discussion board as the answer will likely benefit others as well.

Group Work While I expect you to submit assignments individually in this course, I strongly encourage you to discuss your work and ideas with your classmates. Such discussions can be a rich source of inspiration. If you collaborate with your classmates in this way, consider including them in an acknowledgements section in your work and take care to respect academic integrity.

Equity, Diversity, and Inclusion   The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

2.2   Contact

Please do not hesitate to visit me in my office during scheduled office hours (SS 6015; W 12:00-13:00)! If this mode does not work for you, you may arrange a meeting with me (in person or online) via email.

Outside of class and office hours, the best way to reach me is through email. I will only respond to emails received from a `mail.utoronto.ca` account. Please email me at my University of Toronto email address (`can.mekik@utoronto.ca`) using your `mail.utoronto.ca` email.

When emailing me, please take care to include the course code in the subject line. If your email is longer than a few sentences, I recommend that you visit me during office hours or request a meeting. If you do not receive a reply within 48 hours of sending your email, please feel free to send me a reminder.

2.3   Quercus

This course uses the University's learning management system, Quercus, to manage information about the course. This includes posting readings and other materials required to complete class activities and course assignments, as well as sharing important announcements and updates. The site is dynamic and new information and resources will be posted regularly as we move through the term, so please make it a habit to log in to the site on a regular, even daily, basis.

Access to Course Website   To access the course website, go to the U of T Quercus login page at `https://q.utoronto.ca`. Once you have logged in to Quercus using your UTORid and password, you should see the link or "card" for 'Computational Psychology PSY471H1 F LEC0201'. You may need to scroll through other cards to find this. Click on the 'Computational Psychology PSY471H1 F LEC0201' link to open our course area, view the latest announcements and access your course resources. There are Quercus help guides for students that you can access by clicking on the "?" icon in the left side column.

Grades Posted Online   Please note that any grades posted online are for your information only, so you can view and track your progress through the course. No grades are considered official, including any posted in Quercus at any point in the term, until they have been formally approved and posted on ACORN at the end of the course. Please contact me as soon as possible if you think there is an error in any grade posted on Quercus.

Warning: Quercus Inbox and Replies to Announcements   Note that Quercus has a built-in communication tool, called "Inbox". This is not the same as your `mail.utoronto.ca` email. I strongly advise that you use email instead, as I will not be regularly monitoring the Quercus Inbox. Also please do not to include attachments in replies to any Quercus system notifications you receive through email; messages with attachments included in replies to these system notification messages are not sent to the instructor.

2.4   Late/Missed Work

Time management is essential for your success and well-being in life. That said, I understand that you may sometimes be unable to honor deadlines or other time commitments.

   If you find yourself consistently missing deadlines or other time commitments, it may be indicative of a more serious underlying issue. In this case, I strongly recommend that you get in touch with campus resources who are equipped to help you identify and address the problem (see 'Campus Resources' section below).

Take-Home Assignments   Take-home assignments, such as papers and posts, will be granted a 72 hour grace-period in case they are late. The grace period is for emergencies only. Please use it sparingly.

   I will not accept take-home assignments after the grace period. If you need accommodations (due to disability, religious holidays, or personal circumstances), please refer to the section on accommodations below.

In-Class Assignments   In-class assignments, like tests and presentations, will not be repeated. If you must miss an in-class assignment, please arrange for accommodations with me as soon as possible.

Signup Sheets   I may ask you to fill out various signup sheets to give you some control over assignment deadlines and assessment dates. These signup sheets have hard deadlines. If you do not complete a signup sheet by the deadline, I will assign you a date.

2.5   Accommodations

Specific Medical Circumstances   If you become ill and it affects your ability to do your academic work, consult me right away. Normally, I will ask you for documentation in support of your specific medical circumstances. This documentation can be an Absence Declaration (via ACORN) or the University's Verification of Student Illness or Injury (VOI) form. The VOI indicates the impact and severity of the illness, while protecting your privacy about the details of the nature of the illness. You can submit a different form (like a letter from a doctor), as long as it is an original document, and it contains the same information as the VOI. For more information on the VOI, please see `http://www.illnessverification.utoronto.ca`. For information on Absence Declaration Tool for A&S students, please see `https://www.artsci.utoronto.ca/absence`. If you get a concussion, break your hand, or suffer some other acute injury, you should register with Accessibility Services as soon as possible.

Students with Disabilities or Accommodation Requirements   Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting `https://studentlife.utoronto.ca/department/accessibility-services/`. Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS.

Religious Accommodations   As a student at the University of Toronto, you are part of a diverse community that welcomes and includes students and faculty from a wide range of cultural and religious traditions. For my part, I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by statutory holidays. Further to University Policy, if you anticipate being absent from class or missing a major course activity (such as a test or in-class assignment) due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two to three weeks), so that we can work together to make alternate arrangements.

Accommodation for Personal Reasons   There may be times when you are unable to complete course work on time due to non-medical reasons. If you have concerns, speak to me or to an advisor in your College Registrar's office; they can help you to decide if you want to request an extension or other forms of academic consideration. They may be able to email your instructors directly to provide a College Registrar's letter of support and connect you with other helpful resources on campus.

2.6   Grading Concerns

Upon receiving a grade, please allow 24 hours before contacting me about grading concerns and allow yourself to reflect on your performance and grade. If you still have a concern at the end of this period, you may submit one regrade request for your assignment via email.

Your request should consist of a short paragraph detailing your concern and it should be submitted within two weeks of receiving your grade. If your request is reasonable and well-justified, I will regrade your work. Please note that, upon reassessment, your grade may increase, decrease, or stay the same. I will regrade the same assignment only once and I will not consider any regrade request for grades older than two weeks.

2.7   Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters (`https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019`). If

you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to me. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources. For example, to learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at `http://www.writing.utoronto.ca`. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see A&S Student Academic Integrity (`https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity`) and the University of Toronto Website on Academic Integrity (`https://www.academicintegrity.utoronto.ca`).

2.8 Generative AI

You are free to experiment with artificial intelligence (AI), including generative AI, in this course if you choose to do so. You may use such tools as learning aids or to help produce assignments. However, you are ultimately accountable for the work you submit and material generated by AI is subject to the academic integrity policy.

If you choose to use AI in your work, please carefully consider whether your usage may violate academic integrity and consult with me if you have any doubts. In particular, you may not submit AI-generated material if submitting such material would constitute plagiarism had it been authored by a human other than yourself, found online, or released in print. Any AI-generated content must be cited appropriately. I will view violation of these requirements as academic dishonesty. Please also note that generative AI is not an appropriate or reliable source of factual information and should not be cited for this purpose.

2.9 Cell Phones and Laptop Usage

Technology can support student learning, but it can also become a distraction. Research indicates that multi-tasking during class time can have a negative impact on learning. Out of respect for your fellow students in this class, please refrain from using laptops or mobile phones for purposes unrelated to the class. Do not display any material on a laptop which may be distracting or offensive to your fellow students

Activity	Assignment	Due	Weight (%)
Participation	Attendance	Ongoing	5
	Engagement	Ongoing	10
	Midterm Reflection	10-25	5
Reading Election	Proposal	10-04	5
	Deliberation	11-01	5
Reaction Papers	Paper 1	You Choose	15
	Paper 2	You Choose	15
Research Paper	Initial Draft	10-18	10
	Presentation	You Choose	15
	Revised Draft	12-06	15

Table 1: Summary of assessments, deadlines, and relative weights.

3 Assessments

Assessments in this course fall under four headings: Participation, Reading Election, Reaction Papers, and Research Paper. There are multiple assessments under each heading. Assessments, deadlines, and relative weights are summarized in Table 1.

3.1 Participation

The participation assignments in this course are designed to encourage active class engagement for everyone.

Attendance   Every class that you attend, you will gain 0.5 points in attendance towards your final grade, up to a total of 5 points. This scheme allows for up to two absences without penalty.

Engagement   Every week, you may gain up to 1 point in class engagement towards your final grade, up to a total of 10 points. In general, one interaction will grant you one point, however the point may be witheld if your interaction violates the norms of polite scholarly discussion.

Class engagement includes taking the floor in class (e.g., to ask a question, make a comment, or answer a question), or posting on the Qurecus discussion board. Questions about logistical matters like assignment requirements and deadlines will not count towards engagement. In the first week of class, I may circulate an entrance survey. Completion of this survey will count towards class engagement for that week.

Midterm Reflection   Half-way through the course, you will be invited to take a midterm reflection survey. The survey is an opportunity for you to express your thoughts about the progression of the course and your own learning. The survey will run between 10-11 and 10-25.

3.2 Reading Election

The reading election activity is your opportunity to have the class engage with two readings of your choice. This is also an opportunity for you to get started on your research paper (see Research Paper below for details): you may write your research paper on the readings you propose for the election.

The class will elect, by approval vote, two proposals to determine readings for the final two weeks of the semester. The proposal with highest approval will be taken up in our last meeting (12-06), and the runner-up will be taken up in our penultimate meeting (11-27).

You must post your proposal on Quercus for the class to read. I will post my own proposal as well and I will make it available to you as a sample. You may view, discuss, and express approval for any proposals that are on Quercus. Every like on a proposal will be counted as an approval vote. You may vote for as many proposals as you choose, including your own, and you may change your votes as many times as you like until the end of the voting period.

Proposal Post a reading proposal by replying to the discussion topic 'Choose Your Own Readings!' by the start of class on 10-04. To be complete, your proposal must include a theme, two readings, and a brief pitch on Quercus.

The theme you propose must be original (i.e., different from those addressed in scheduled meetings or other proposals). Ideally, themes should be short and focused. If your proposal is elected by the class, its theme will serve as the title for the corresponding class session. If you will be using the readings from your proposal in your research paper, you may align your proposed theme with the general topic of your research paper. However, the theme should have a more general character and cannot be identical to the thesis of your research paper.

The readings you propose must relate to the proposed theme and may not exceed a total of 60 pages in length. At least one of the two readings must present a cognitive model. The second reading may present a contrasting cognitive model. Alternatively, the second reading may present empirical, theoretical, and methodological considerations relevant to both the theme and the first reading. Your proposal must also include a suggested reading order.

The pitch is your opportunity to express the reasoning behind your proposal. In 200 words or less, discuss why you think the class should address your theme, how the readings relate to the theme, how the readings relate to each other, and the suggested reading order.

Deliberation Post a brief and original statement of support for one proposal other than your own by the end of the voting period on 11-01. Your statement should present a novel argument in favor of the proposal you support. You must post your statement as a reply to the proposal you support.

3.3 Reaction Papers

Reaction papers are an opportunity for you to engage deeply with readings that interest you. Reaction papers also help improve the quality of classroom discussions and present an opportunity for you to shape the conversation.

In your reaction papers, I expect you to briefly summarize the main ideas and conclusions of the week's readings and then to provide some commentary. Any substantive commentary

on the readings is acceptable as long as it is written in the spirit of a scholarly discussion (i.e. constructive criticism). Consider discussing whether you found either or both readings convinicing, how the readings fit into existing knowledge, whether they have any notable implications or limitations, or any other ideas that you may find worthy of discussion.

Reaction papers for a given week are due on Quercus at 16:00 on the preceding Friday. I will read them in preparation for class. To determine your reaction paper due dates, please fill out the reaction paper signup form on Quercus by 09-15.

You must submit two reaction papers for the weeks spanning 09-27 and 11-01 (inclusive). You may only submit one reaction paper per week. Reaction papers must follow the APA (7th ed.) manuscript format and they may be no more than 3 pages in length.

3.4   Research Paper

The goal of the research paper is to introduce you to the practice of cognitive modeling research, gain experience in the process of scholarly writing, and explore a model that interests you in depth.

In your research paper, you must propose a research project that follows from an existing model of your choosing. For instance, you may propose to address a limitation of the model (or study) that you have chosen, you may propose a novel experiment or simulation to test some interesting aspect of the model, or you may even propose a technical extension or improvement to the existing model.

To write your research paper, you must select a psychological topic and an existing model addressing that topic. You are expected to review relevant literature and discuss the relevance of the topic, the chosen model, and the motivations for your proposal. You are also expected to provide a detailed research plan. For instance, if you are proposing a novel experiment, your paper should include information about the experimental task, procedure, design, expected results, and possible outcomes. You may address papers from your proposal for the reading election in your research paper (see Reading Election for details).

Ideally, your project proposal should, if taken to completion, be fit for submission to a conference like the International Conference on Cognitive Modeling (ICCM) or the Cognitive Science Conference. These conference papers are usually about 4000 words in length and discuss one experiment or model. So, if you follow the instructions above, your paper should be in good shape. That said, you are not expected to carry out your project for the course.

Your work on the research paper has three separate graded components: an initial draft, a class presentation, and a revised draft.

Initial Draft   An initial draft of your research paper is due at the start of class on 10-18. This draft is limited to a maximum of 10 pages in APA manuscript format (7th ed).

Prior to working on the initial draft, it is imperative that you discuss your choice of topic and model with me. This step is meant to ensure that your project is feasible, and failure to complete it may result in lost marks.

Your draft should include a literature review and discussion of the project motivation, basic idea, and approach. These elements should be presented in clear scholarly prose and they should be supported with relevant citations. For this draft, your research plan need

not be fully fleshed out. You will have an opportunity to add further details in your revised draft.

Presentation   Following submission of your initial draft, you will present your work to the class. This exercise will allow you to receive feedback on your work from your classmates, practice preparing and delivering a scholarly presentation, and gain a broader perspective on the cognitive modeling world through your classmates' presentations.

   Presentations will be 5 minutes in length followed by up to 5 minutes of class discussion. You must sign up for a presentation session using the signup sheet on Quercus by 09-15.

Revised Draft   A revised draft of your paper is due at the start of our last class, on 12-06. I expect you to incorporate feedback (both from me and your classmates) on your initial draft and your presentation. You may expand and further detail your proposal. Your revised draft must be between 10 and 15 pages in APA manuscript format.

4   Schedule

The class schedule is listed below. Sources are shown in suggested reading order.

09-13 Due: Entrance survey

   Meeting 1: Introductions

   Syllabus

   Simon, H. A. (1992). What Is an "Explanation" of Behavior? Psychological Science, 3(3), 150-161. `https://doi.org/10.1111/j.1467-9280.1992.tb00017.x`

09-15 Due: Reaction paper and presentation signup sheets.

09-20 Meeting 2: The Big Picture

   Sun, R. (2023). An Overview of Computational Cognitive Sciences. In R. Sun (Ed.), The Cambridge Handbook of Computational Cognitive Sciences (Cambridge Handbooks in Psychology, pp. 3-26). Cambridge: Cambridge University Press. `doi:10.1017/9781108755610.003`

   Anderson, J. R. (2007). Cognitive Architecture. In How Can the Human Mind Occur in the Physical Universe? Oxford University Press. `https://doi.org/10.1093/ac prof:oso/9780195324259.003.0001`

09-22 Due: Reaction papers for Meeting 3

09-27 Meeting 3: Memory Retrieval

   Anderson, J. R., & Schooler, L. J. (1991). Reflections of the Environment in Memory. Psychological Science, 2(6), 396–408. `https://doi.org/10.1111/j.1467-9280.19 91.tb00174.x`

Anderson, J. R., Bothell, D., Lebiere, C., & Matessa, M. (1998). An Integrated Theory of List Memory. Journal of Memory and Language, 38(4), 341–380. `https://doi.org/10.1006/jmla.1997.2553`

09-29 Due: Reaction papers for Meeting 4

10-04 Due: Reading proposal

Meeting 4: Methodology

Roberts, S., & Pashler, H. (2000). How Persuasive Is a Good Fit? A Comment on Theory Testing. Psychological Review, 107(2), 358–367. `https://doi.org/10.1037/0033-295X.107.2.358`

Blaha, L., & Gluck, K. (2023). Model Validation, Comparison, and Selection. In R. Sun (Ed.), The Cambridge Handbook of Computational Cognitive Sciences (Cambridge Handbooks in Psychology, pp. 1165-1200). Cambridge: Cambridge University Press. `doi:10.1017/9781108755610.042`

10-06 Due: Reaction papers for Meeting 5

10-11 Meeting 5: Choice Response Times

Brown, S. D., & Heathcote, A. (2008). The simplest complete model of choice response time: Linear ballistic accumulation. Cognitive Psychology, 57(3), 153–178. `https://doi.org/10.1016/j.cogpsych.2007.12.002`

van der Velde, M., Sense, F., Borst, J. P., van Maanen, L., & van Rijn, H. (2022). Capturing Dynamic Performance in a Cognitive Model: Estimating ACT-R Memory Parameters With the Linear Ballistic Accumulator. Topics in Cognitive Science, 14(4), 889–903. `https://doi.org/10.1111/tops.12614`

10-13 Due: Reaction papers for Meeting 6

10-18 Due: Initial draft for research paper

Meeting 6: Multitasking

Salvucci, D. D., & Taatgen, N. A. (2008). Threaded Cognition: An Integrated Theory of Concurrent Multitasking. Psychological Review, 115(1), 101–130. `https://doi.org/10.1037/0033-295X.115.1.101`

Feng, S. F., Schwemmer, M., Gershman, S. J., & Cohen, J. D. (2014). Multitasking versus multiplexing: Toward a normative account of limitations in the simultaneous execution of control-demanding behaviors. Cognitive, Affective, & Behavioral Neuroscience, 14(1), 129–146. `https://doi.org/10.3758/s13415-013-0236-9`

10-20 Due: Reaction papers for Meeting 7

10-25 Due: Midterm reflection

Meeting 7: Implicit Learning

Sun, R., Slusarz, P., & Terry, C. (2005). The Interaction of the Explicit and the Implicit in Skill Learning: A Dual-Process Approach. Psychological Review, 112(1), 159–192. `https://doi.org/10.1037/0033-295X.112.1.15`

French, R. M., Addyman, C., & Mareschal, D. (2011). TRACX: A Recognition-Based Connectionist Framework for Sequence Segmentation and Chunk Extraction. Psychological Review, 118(4), 614–636. `https://doi.org/10.1037/a0025255`

10-27 Due: Reaction papers for Meeting 8

11-01 Due: Reading deliberation; Voting closes

Meeting 8: The Common Model of Cognition

Laird, J. E., Lebiere, C., & Rosenbloom, P. S. (2017). A Standard Model of the Mind: Toward a Common Computational Framework Across Artificial Intelligence, Cognitive Science, Neuroscience, and Robotics. The AI Magazine, 38(4), 13–26. `https://doi.org/10.1609/aimag.v38i4.2744`

Stocco, A., Sibert, C., Steine-Hanson, Z., Koh, N., Laird, J. E., Lebiere, C. J., & Rosenbloom, P. (2021). Analysis of the human connectome data supports the notion of a "Common Model of Cognition" for human and human-like intelligence across domains. NeuroImage (Orlando, Fla.), 235, 118035–118035. `https://doi.org/10.1016/j.neuroimage.2021.118035`

11-08 Reading Week; No Class!

11-15 Meeting 9: Presentations

11-22 Meeting 10: Presentations

11-29 Meeting 11: Elected Readings

12-06 Due: Revised Draft

Meeting 12: Elected Readings

5   Campus Resources

Mental Health and Well-Being   As a student, you may experience challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation, financial concerns, family worries and so forth. These factors may affect your academic performance and/or reduce your ability to participate fully in daily activities. Everyone feels stressed now and then – it is a normal part of university life. Some days are better than others, and there is no wrong time to reach out. There are resources for every situation and every level of stress. There are many helpful resources available through your College Registrar or through Student Life (`http://studentlife.utoronto.caandhttp://www.studentlife.utoronto.ca/feeling-distressed`). An important part of the University experience is learning how and when to ask for help. Please take the time to inform yourself of available resources.

Academic Success Centre Academic Success in Student Life offers programming and services to help you achieve your academic goals. Check out their study spaces, attend a workshop or meet with a learning strategist here: `https://studentlife.utoronto.ca/de` `partment/academic-success/`

English Language Resources If you would like to advance your understanding and command of English, there are many supports available at UofT. Two examples are listed below.
- `https://www.artsci.utoronto.ca/current/academic-advising-and-support/e` `nglish-language-learning`
- `https://advice.writing.utoronto.ca`

Your registrar will also be able to direct you to other resources.

6 Final Remarks

When you are first getting into cognitive modeling the material can be quite daunting. The field relies heavily on mathematics, statistics, and computer science, and it often uses advanced knowledge from these fields in creative and unexpected ways. I won't lie: it can be difficult and even disorienting to sort through the details. But, don't be alarmed! Often, the basic insights are quite simple and understandable. I do not expect you to go deep into the technical details and I will do my best to make them accessible to you. That said, the rewards for engaging with such material are well-worth the challenge: You will learn to formulate and analyze precise, mechanistic models of psychological processes! It is a wonderful skill to have if you are interested in theory-building and it can also be illuminating for empirical research. I am very happy that you will be with us on this journey and I hope you enjoy the course!